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# WETLAND STATUS AND TRENDS IN SELECTED AREAS OF MARYLAND'S FALL ZONE (1981-82 to 1988-89)

U.S. Department of the Interior
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# Wetland Status and Trends in Selected Areas of Maryland's Fall Zone (1981-82 to 1988-89)

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## INTRODUCTION

Wetlands are subjected to multiple impacts, both natural and human-induced. They may change from one type to another, e.g., emergent wetland to scrub-shrub wetland, due to natural succession or to minor filling or drainage. Wetlands are also destroyed, largely by human activities (direct or indirect). Most wetlands change more slowly over time. Knowledge of wetland losses and gains is important for evaluating the effect of government programs and policies designed to protect wetlands and for developing effective strategies to reverse undesirable trends.

The U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (FWS) provided funding to initiate quadrangle-based wetland trends studies for selected areas in the Chesapeake Bay Watershed. These studies identify the extent and nature of small- and large-scale wetland alterations for selected local areas.

The purpose of this report is to present the findings of the wetland trends analysis study for two areas in Maryland's Fall Zone, one of 18 Maryland study areas selected by the EPA and FWS for detailed wetland trends analysis. This is the second report completed for this interagency cooperative project.

## STUDY AREA

The study sites are located mostly in the Fall Zone of Maryland (Figure 1) and have a combined land surface area of 114 square miles. In addition, deepwater habitat accounts for 830 acres (1.3 square miles), with 602 acres belonging to the estuarine system, 34 acres belonging to the lacustrine system and 194 acres belonging to the riverine system. The study area encompasses two large-scale (1:24,000) U.S. Geological Survey topographic quadrangles: Relay and White Marsh.

## METHODS

Wetland trends analysis involves comparing aerial photography from at least two time periods. For the present study, aerial photos from 1981-82 and from 1988-89 were examined and compared to determine the extent of the wetland changes (losses, gains, or changes in wetland type) that occurred during that time period in the study area.

The 1981-82 photography was 1:58,000 scale color infrared (CIR) aerial photography acquired by the U.S. Geological Survey's National High-Altitude Photography Program (NHAP). The 1988-1989 photography was 1:40,000-scale CIR aerial photography acquired by the National Aerial Photography

Program (NAPP). Wetlands and deepwater habitats were initially interpreted on the 1:58,000 photography and classified according to the Service's official wetland classification system (Cowardin, et al. 1979), following standard NWI mapping conventions (National Wetlands Inventory, 1990). These interpretations served as the basis for evaluating current wetland status and recent trends.

The two sets of photographs were compared using an Ottico Meccania Italiana stereo facet plotter. Changes and map refinements were transferred to an NWI map using this device. Causes of change were recorded for each polygon. The minimum mapping unit for wetlands was generally 1/2 acre, except for ponds, which were mapped when 1/10th of an acre or larger in size. Changes as small as 1/10th acre were detected. Wetland boundaries were improved and previously undetected wetlands were added to the original maps because the larger scale and more apparent seasonal signs of wetland hydrology on the NAPP photos improved our ability to detect and classify wetlands. Quality control of all photo interpretation was performed by a second photointerpreter. Field work was conducted to verify changes in classification in selected areas with questionable photographic signatures. These results were used to improve wetland mapping for the original time period, especially for temporarily flooded, broad-leaved deciduous forested wetlands, and small wetlands that had been missed during the original interpretation.

Interpreted data were digitized and acreage summaries generated. Tables were then prepared to present the study's findings.

## RESULTS

### *Current Wetland Acreage*

In 1988-89, the study area possessed about 1,692 acres of wetlands, excluding linear fringing wetlands along narrow streams. This total amounts to roughly 2.3 percent of the area's land surface. Table 1 summarizes the acreage of the different wetland types found in the study area.

Palustrine wetlands predominate, with about 1,402 acres. This represents about 83 percent of the study area's total wetland acreage. Deciduous forested wetlands alone account for 68 percent of the study area's palustrine wetlands.

Estuarine wetlands represent about 15 percent of the study area's wetlands. Emergent wetlands (e.g., brackish marshes) are the predominant type, accounting for almost 94 percent of the study area's estuarine wetlands. These wetlands are mostly located along tidal rivers that empty into the

Patapsco River in Relay and the Bird River in White Marsh. Slightly brackish marshes (oligohaline) are characteristic.

*Recent Wetland Trends*

The results of the wetland trends analysis study are presented in Tables 2 through 9. The following discussion highlights the more significant or interesting findings.

*Vegetated Wetlands*

Given the short time period examined (approximately 7.0 years), most of the vegetated wetlands in the study area remained unchanged. Only 2.1 percent of these wetlands changed in some way (Table 2). Fifty-two percent of these changes involved filling wetlands to create land for development (upland). Palustrine forested wetlands were the most adversely impacted with about 13 acres converted to upland (Table 5). The major causes of wetland destruction were housing development and road and highway construction (Tables 3 and 6). Temporarily flooded wetlands received the brunt of the adverse impacts (Table 4), with 78 percent of the total loss. Change from one wetland type to another accounted for 48 percent of the total change in the original (1981-82) wetlands (Table 2).

In addition to the losses of vegetated wetlands, there were some gains (Table 7). Gains from nonvegetated wetlands were most common. Much of the gain from nonvegetated wetlands involved the establishment of palustrine emergent wetlands (freshwater marshes) due to succession, both natural and man-induced. Despite some gains in vegetated wetlands from nonvegetated wetlands, there was a net loss of about 10 acres of vegetated wetlands between 1981-82 and 1988-89 (Tables 2 and 7).

*Nonvegetated Wetlands*

In marked contrast to the downward trend in vegetated wetlands, nonvegetated wetlands are increasing, largely due to pond construction. There was a net gain of about 6.02 acres in palustrine nonvegetated wetlands from uplands and vegetated wetlands between 1981-82 and 1988-89 (Table 8). In this study area, approximately 97 percent of this gain was offset by conversion of gravel pit ponds to nonvegetated lacustrine wetlands, due to activity in sand and gravel pits, leaving a total net gain of 0.2 acres of nonvegetated palustrine wetlands.

*Summary*

The study area has about 2.3 percent of its land mass covered by wetlands. Wetlands totaling 1,692 acres (in 1988-89) were identified in the study area by the Service's National Wetlands Inventory. Palustrine forested wetland is the dominant wetland type, representing 56 percent of the wetlands in the study area.

Between 1981-82 and 1988-89, the study area lost about 18.6 acres of vegetated wetlands, with roughly 16 acres converted to upland. Temporarily flooded forested wetland was the type most frequently converted to upland. Pond construction added about 23 acres of palustrine nonvegetated wetlands, but this gain was essentially nullified by pond losses in upland and vegetated wetlands. The overall trend for the study area's wetlands was losses of vegetated wetlands and slight gains in nonvegetated wetlands (mostly ponds). The significance of the increase in ponds to fish and wildlife species has not been assessed and remains a point for discussion. The losses of vegetated wetlands, however, represent known losses of valuable fish and wildlife habitats and areas providing other valued functions. While this report documents recent trends in the study area's wetlands, it does not address changes in the quality of the remaining wetlands. As development increases, the quality of wetlands can be expected to deteriorate due to runoff, increased sedimentation, groundwater withdrawals, increased water pollution, and other factors, unless adequate safeguards are taken to protect not only the existence of wetlands, but their quality.

## ACKNOWLEDGMENTS

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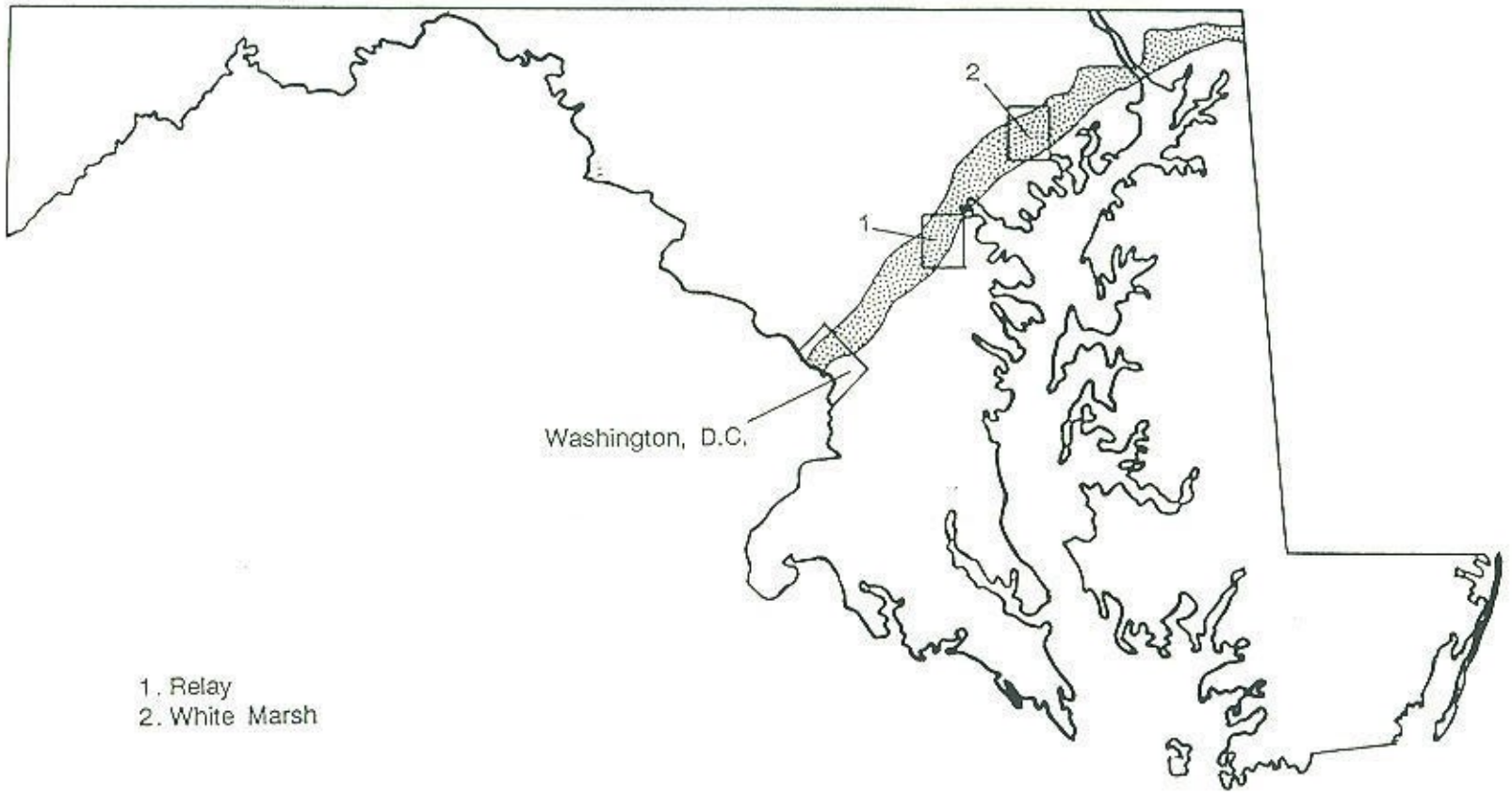
## REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. 103 pp.

National Wetlands Inventory. 1990. Photointerpretation Conventions for the National Wetlands Inventory. U.S. Fish and Wildlife Service, St. Petersburg, FL. 45 pp. plus appendices.

Figure 1. Location of Study Area - Selected NWI Maps in the Fall Zone of Maryland.




1. Relay
2. White Marsh

* Shaded area = Fall Zone

**Table 1. 1988-89 acreage of wetland types in selected areas in the Fall Zone of Maryland.**

| Wetland Type | Acres |
|---|---|
| PALUSTRINE WETLANDS | |
| **Tidal Emergent** | 90.67 |
| **Nontidal Emergent** | |
| Seasonally Flooded/Saturated | 21.53 |
| Seasonally Flooded | 17.57 |
| Temporarily Flooded | 43.80 |
| Semipermanently Flooded | 1.09 |
| Saturated | 4.32 |
| Subtotal Nontidal | 88.31 |
| Total Palustrine Emergent Wetlands | 178.98 |
| **Tidal Forested** | 194.90 |
| **Nontidal Forested** | |
| Evergreen Broad-leaved | |
| Temporarily Flooded | 1.14 |
| Deciduous | |
| Seasonally Flooded/Saturated | 49.95 |
| Seasonally Flooded | 208.04 |
| Temporarily Flooded | 493.81 |
| Subtotal Nontidal | 752.94 |
| Total Palustrine Forested Wetlands | 947.84 |
| **Tidal Scrub-shrub** | 13.74 |
| **Nontidal Scrub-shrub** | |
| Seasonally Flooded/Saturated | 7.69 |
| Seasonally Flooded | 30.76 |
| Temporarily Flooded | 35.89 |
| Subtotal Nontidal | 73.34 |
| Total Palustrine Scrub-shrub Wetlands | 88.08 |
| **Aquatic Beds** | 0.64 |
| Total Palustrine Vegetated Wetlands | 1215.54 |
| **Tidal Unconsolidated Bottom** | 5.30 |
| **Unconsolidated Bottoms (Ponds)** | 176.72 |
| **Unconsolidated Shores** | 4.87 |
| Total Palustrine Nonvegetated Wetlands | 186.89 |
| **GRAND TOTAL PALUSTRINE WETLANDS** | **1402.43** |

| Wetland Type | Acres |
|---|---|
| ESTUARINE WETLANDS | |
| Emergent | |
| Persistent | |
| Irregularly Flooded | 3.32 |
| Irregularly Flooded Oligohaline | 222.03 |
| Nonpersistent | |
| Regularly Flooded | 1.14 |
| Regularly Flooded Oligohaline | 18.76 |
| Unconsolidated Shore | 15.04 |
| Total Estuarine Emergent Wetlands | 245.25 |
| Total Estuarine Unconsolidated Shore | 15.04 |
| **GRAND TOTAL ESTUARINE WETLANDS** | **260.29** |
| RIVERINE WETLANDS | |
| Tidal Emergent | 1.88 |
| Nontidal Unconsolidated Shore | 18.35 |
| **GRAND TOTAL RIVERINE WETLANDS** | **20.23** |
| LACUSTRINE WETLANDS | |
| Unconsolidated Shore | 8.86 |
| **GRAND TOTAL LACUSTRINE WETLANDS** | **8.86** |
| **TOTAL WETLANDS** | **1691.81** |

**Table 2. Changes of vegetated wetlands in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Wetland Type | Converted to Upland (acres) | Changed to Other Vegetated Wetlands * (acres) | Changed to Nonvegetated Wetlands (acres) |
|---|---|---|---|
| Palustrine Emergent | 0.80 | 0.00 | 2.55 |
| Palustrine Scrub-Shrub | 2.25 | 0.00 | 0.00 |
| Palustrine Forested | 13.06 | 7.72 | 0.00 |
| Estuarine Emergent | 0.00 | 4.38 | 0.00 |
| | 16.11 | 12.10 | 2.55 |

* Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given wetland class.

**Table 3. Causes of vegetated wetland loss to upland in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Cause of Loss | Acres | Percentage |
|---|---|---|
| Housing | 8.57 | 53.20 |
| Roads/Highways | 6.75 | 41.90 |
| Unknown | 0.44 | 2.70 |
| Sand and Gravel Pits | 0.35 | 2.20 |
| Total | 16.11 | 100.00 |

**Table 4. Conversion of hydrologically similar palustrine vegetated wetlands to upland in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Palustrine Wetland Type | Acres | % of Total Loss |
|---|---|---|
| Temporarily Flooded | 12.62 | 78.30 |
| Seasonally Flooded | 1.72 | 10.70 |
| Seasonally Flooded/Saturated | 1.42 | 8.80 |
| Seasonal - Tidal | 0.35 | 2.20 |
| | 16.11 | 100.00 |

**Table 5. Changes in palustrine forested wetlands in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Forested Wetland Type | Converted to Upland (acres) | Changed to Other Wetland Types * (acres) | Total Loss (acres) |
|---|---|---|---|
| Temporarily Flooded | 9.57 | 5.05 | 14.62 |
| Seasonally Flooded | 1.72 | 1.20 | 2.92 |
| Seasonally Flooded/Saturated | 1.42 | 1.47 | 2.89 |
| Seasonal - Tidal | 0.35 | 0.00 | 0.35 |
| | 13.06 | 7.72 | 20.78 |

* Includes both changes in class (e.g., forested to emergent) and changes in water regime within a given class.

**Table 6. Causes of loss in palustrine forested wetlands in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Palustrine Forested Type | Converted to Upland (acres) | Cause of Loss for PFO |
|---|---|---|
| Temporarily Flooded | 6.32 | Housing Construction |
| | 3.25 | Road Construction |
| Seasonally Flooded | 1.72 | Road Construction |
| Seasonally Flooded/Saturated | 1.42 | Highway Construction |
| Seasonal Tidal | 0.35 | Highway Construction |
| Total Palustrine Forested Loss | 13.06 | |
| | | |
| Loss of All Palustrine Forested Grouped by Cause | | |
| Subtotals per Cause | 6.32 | Housing Construction |
| | 6.39 | Road/Highway Construction |
| | 0.35 | Sand and Gravel Pit |
| Total Palustrine Forested Loss | 13.06 | |

**Table 7. Gains in vegetated wetlands in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Wetland Type | Gain from Nonvegetated Wetlands (acres) | Gain from Other Vegetated Wetlands * (acres) |
|---|---|---|
| Palustrine Emergent | 5.99 | 3.70 |
| Palustrine Scrub-Shrub | 2.43 | 4.35 |
| Total | 8.42 | 8.05 |

* Represents changes in class (e.g., emergent to scrub-shrub) but not changes in water regime within a given class.

**Table 8. Gains and losses in palustrine nonvegetated wetlands in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Wetland Type | GAINS | | LOSSES | | |
|---|---|---|---|---|---|
| | Created From Upland (acres) | Created In Vegetated Wetlands (acres) | Converted to Upland (acres) | Changed to Vegetated Wetlands (acres) | Changed to Nonvegetated Lacustrine Wetlands |
| Palustrine Unconsolidated Bottom | 17.88 | 2.55 | 7.60 | 8.42 | 6.02 |
| Palustrine Unconsolidated Shore | 2.83 | 0.00 | 1.02 | 0.00 | 0.00 |
| TOTAL | 20.71 | 2.55 | 8.62 | 8.42 | 6.02 |

**Table 9. Causes of recently constructed ponds on upland sites in selected areas in the Fall Zone of Maryland (1981-82 to 1988-89).**

| Causes | Pond Acreage Created |
|---|---|
| Sand and Gravel Pits | 5.65 |
| Stormwater Detention Basins | 4.34 |
| Sanitary Landfill | 3.33 |
| Agriculture | 2.38 |
| Commercial/Industrial Development | 2.17 |
| Roads/Highway Construction | 1.23 |
| Other Ponds (on Public Lands, Unintentional Impoundments, etc.) | 0.66 |
| Ponds in Undeveloped Areas | 0.52 |
| Urban Ponds | 0.43 |
| | 20.71 |